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LETTER TO THE EDITOR

GTC OSIRIS z-band imaging of Y dwarfs

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ABSTRACT

Aims. The aim of the project is to contribute to the characterisation of the spectral energy distribution of the coolest brown dwarfs discovered to date, the Y dwarfs.
Methods. We obtained z-band far-red imaging for six Y dwarfs and i-band for one of them with the OSIRIS (Optical System for Imaging and low Resolution Integrated Spectroscopy) instrument on the 10.4-m Gran Telescopio de Canarias (GTC).
Results. We detect four of six known Y dwarfs in the z-band, infer their optical-to-infrared colours, and measure their proper motions. We find a larger dispersion in the $z-H$ colours of Y0 dwarfs than in T dwarfs.

Key words. Stars: low-mass — Stars: brown dwarfs — techniques: photometric

1. Introduction

The classical stellar sequence (**?**) has now been extended into very cool objects etc. etc.

2. Far-red optical imaging

2.1. Observations

The OSIRIS instrument is mounted on the 10.4-m GTC operating at the Observatory del Roque de Los Muchachos (La Palma, Canary Islands).

2.2. Data reduction and photometry

We reduced the OSIRIS Sloan z-band images in a standard manner under the IRAF environment[1] (**??**).

2.3. Astrometry

We fine-tuned the astrometric calibration of the final combined science frames using IRAF and `ds9` (**?**).

3. Discussion and conclusions

We report in this letter the first far-red optical detection of four Y0 dwarfs, the coolest brown dwarfs known to date. All four Y0 dwarfs with z-band detection have magnitudes in the range 22.8–24.1 mag, implying $z-J$ and $z-H$ colours spanning 3.2–4.7 mag and 2.4-5.4 mag, respectively. We also present a lower limit of $z-H$ of 3.35 mag WISE1405+5534, a potentially peculiar Y dwarf, although its H magnitude is also a lower limit.

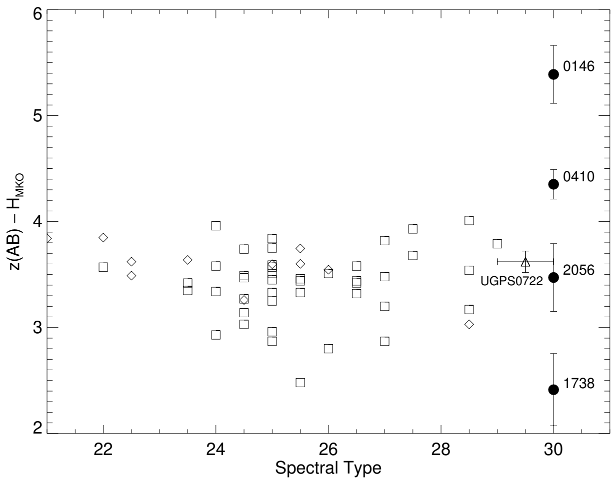

Fig. 1. $z-H$ colours of late-T (open squares and diamonds; **??**), UGPS J072227.51−054031.2 (open triangle; **??**), and Y0 dwarfs (filled dots; this work) as a function of spectral type

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